

2013 Exotic Plant Management Program Summary Report Acadia National Park, Maine

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December 31, 2013

Acadia National Park Resource Management Report 2013-12

BEFORE:



AFTER:



Bush honeysuckle (*Lonicera maackii*) treatment area on NPS lands near Great Meadow Drive, July 8, 2013.

Management Summary

The National Park Service's (NPS) Acadia National Park (ANP) Exotic Plant Management Team (EPMT) continues to protect the long term ecological functions of park environments by managing the most threatening exotic (non-native) invasive plant (EIP) species, preventing their establishment, and restoring native habitats. The mission of the EPMT is to safely, professionally, and efficiently manage approximately 25 of the highest priority EIPs on NPS-administered lands to protect naturally-functioning habitats and allow visitors to experience landscapes unaffected by EIPs. Management actions are based on sound and current science, applied through an integrated pest management (IPM) approach, and include community partnerships, especially outreach and education.

In 2013, 200 acres of wetland and other habitats were systematically surveyed for the presence of EIPs prioritized for management, 63 acres were monitored for treatment effectiveness, and 26 species of EIPs totaling 44 acres were managed on NPS and adjacent private lands. EPMT staff participated in six community outreach events to educate visitors and neighbors about exotic plant identification and management.

The six-person crew spent a total of 2,265 hours managing EIPS and volunteers contributed 318 hours. A 16-day government shutdown in October reduced our field season and adversely affected efforts to manage woody exotic species in the fall.

Direct program costs for calendar year 2013 were \$177,734. This program is funded entirely through five grants and other "soft" funding sources, including: Wetland Mitigation, NPS recreational fee revenues, two new grants procured by Friends of Acadia (FOA) from the Canon Corporation and the Nature Valley Corporation, and the NPS Youth in Parks Program. This figure does not include any of the vegetation program leader's salary, management and administrative support, offices, storage, or vehicles and fuel.

By the Numbers

Area surveyed and monitored: 263 acres

Area treated: 44 acres

Exotic Invasive Plant Species Managed: 26

EPMT Hours: 2,265 (shortened by
Government shutdown in October)

EPMT Crew: 1 master-level certified applicator, February – December (program leader)
1 certified pesticide applicator, May – December (field crew leader)
4 certified pesticide applicators, May - September

Volunteer Hours: 318

Number of Community Outreach Events: 6

Year of ANP Exotic Plant Management: 26th

2013 Project Funding Support: \$177,734

2013 Program Description

EIPs represent a significant threat to the ecosystems of ANP, in particular those lands managed on Mount Desert Island (MDI), which has a long history of human disturbances and introductions of horticultural plants that later proved to be invasive and ecologically damaging. EIPs can degrade or destroy native habitats by displacing the native species that previously occupied the area. In extreme cases, EIPs out-compete native plants and form dense monocultures. EIPs plants can also obstruct or change views enjoyed by park visitors, damage structures, and degrade the cultural resources of the park. Recent research has led to the discovery that one exotic plant species, European buckthorn (*Rhamnus cathartica*), releases chemicals that kill developing amphibians.

Acadia National Park's Exotic Plant Management program goals are to:

- (1) Preserve healthy habitats using **early detection and rapid response** to prevent exotic invasive plant populations from becoming established;
- (2) **Manage existing populations** of exotic invasive plants **to prevent their spread and reduce their populations to thresholds where they no longer adversely impact native ecosystems**; and,
- (3) Employ a professional crew that **safely, effectively and efficiently meets the park's exotic plant management needs using a scientifically-based, integrated, vegetation management approach.**

Early Detection and Rapid Response (EDRR) addresses either a newly introduced species not previously found in the area, such as black swallow wort (*Cynanchum louiseae*), or a new population of a species already existing in the area, such as glossy buckthorn (*Frangula alnus*). Correct identification of the species in question is the first step in the process, particularly with species that are new to the area. Once a species has been positively identified, information is gathered on its biology and proven best management practices. If a "new" invasive plant species can be detected and treated before it has a chance to fully establish itself, the possibility of eradicating it from the site is greatly increased. As time goes by, the amount of disturbance at a site, accumulations of seeds, and populations spreading to surrounding areas decrease the likelihood of eradicating the plant from the site. Furthermore, the cost in time and resources needed for treatment goes up dramatically.

Current EDRR efforts are focused on areas of the park where EIPs are mostly likely to occur and in high-value habitats such as wetlands. These sites include the Bear Brook and Tarn Watersheds that are heavily infested with glossy buckthorn. They also include disturbed areas such as: Wildwood Stable and the carriage road system where horses, vehicles and feeds such as hay can introduce and move weed seeds, construction sites with ground disturbance that creates a habitat for EIP species or where vehicles and heavy equipment could carry weed seeds from infested areas, and areas where high visitor use compacts soils and tramples vegetation, creating disturbance that favor pioneer plant species including many invasive exotics.

Managing EIPs is an ongoing process. Enduring seed banks, undetected individuals, and dispersing populations from adjacent private lands mean that while we can reduce populations below levels where environmental harm occurs, eradication may not be possible. Because of this,

a long-term effort and commitment will be needed to protect natural habitats and maintain views unchanged by EIPs.

The goal of the EPMT regarding established populations of EIPs is to remove sexually mature plants to prevent further seed production, and reduce the population of all managed EIP species to < 1% total cover of the management unit. After the EIP population has been reduced to < 1% total cover, the site will be monitored on a regular basis to determine the need for follow up treatments and to detect any new exotic plant invasions. Although initial treatment efforts can be time and labor intensive, once exotic plant populations are significantly reduced, cyclic maintenance to manage populations at low levels requires much less investment.

All management actions (treatments, survey, or monitoring) are logged on standard data sheets that record the following data: location, personnel involved, hours worked, weather, amount and type of herbicide used, application methods, level of infestation, and the phenology of the dominant exotic species present. All treatment areas are mapped using Global Positioning System (GPS) and Geographic Information System (GIS) to record the location of the infestation, and to help monitor changes in populations over time.

With many sites and species scattered throughout ANP, it is necessary to prioritize what species are treated and when. To that end, we manage the park by zones, and where needed, these have been further broken down into management units. These management units have been mapped using GPS and GIS technology and are currently being surveyed for presence/absence of targeted EIPs.

Park resource managers have also developed management plans for 22 of the EIP species of greatest concern. Although there are more than 22 EIP species that occur in the park, these species were chosen for active management because of the threat they pose to the resources of the park (invasiveness), and the EPMT's ability to successfully manage them (treatability). These plans describe species abundance and location within the park, and provide information about habitat, species identification and best management practices. These plans and scientific literature are reviewed and updated regularly to ensure that they prescribe up-dated management strategies based on the latest scientific and exotic plant management techniques.

In addition to the 22 management plans, the EPMT has a list of best management practice for 10 other species that are treated less frequently, and are not currently considered to be as threatening to park resources. All exotic plant management plans and actions are based on the following principals of IPM.

- 1:** Survey the area to identify and determine the location and extent of EIP infestations. Survey scientific literature and base future management actions on a thorough understanding of the biology of the invasive species, possible treatments, and potential effects.
- 2:** Prioritize the known infestations based on their potential rate of spread, location, and the feasibility of successful treatment.
- 3:** Consider all available treatment options and select the method that will most effectively treat the species of concern with the least potential environmental damage.

- 4: Monitor treated areas to determine treatment success and the need for re-treatment or restoring treated areas with native species.
- 5: Evaluate treatment results and use these results to guide future management actions.

Priority Exotic Invasive Plant Species Managed in 2013

Species Managed to Significantly Reduce Populations in Designated Treatment Areas:

Garlic mustard <i>Alliaria petiolata</i>	Glossy buckthorn <i>Frangula alnus</i>
Oriental bittersweet <i>Celastrus orbiculata</i>	Honeysuckle species <i>Lonicera spp.</i>
Canada thistle <i>Cirsium arvense</i>	Purple loosestrife <i>Lythrum salicaria</i>

Species Managed to Keep Populations Below Ecological Impact Thresholds:

Amur maple <i>Acer ginnala</i>	Shrubby St. Johnswort <i>Hypericum prolificum</i>
Norway maple <i>Acer platanoides</i>	Privet <i>Ligustrum spp.</i>
Burdock <i>Arctium minus</i>	Garden lupine <i>Lupinus polyphyllus</i>
Barberry species (<i>Berberis spp.</i>)	Forest woodrush <i>Luzula luzuloides</i>
European bittercress <i>Cardamine impatiens</i>	Multiflora rose <i>Rosa multiflora</i>
Spotted knapweed <i>Centaurea stoebe</i>	Bittersweet nightshade <i>Solanum dulcamara</i>
Japanese knotweed <i>Fallopia japonica</i>	Coltsfoot <i>Tussilago farfara</i>
Giant hogweed <i>Heracleum mantegazzianum</i>	



Cut and treated Oriental bittersweet vines on the Old Farm (NPS) property near Compass Harbor, town of Bar Harbor.

Due to the many hazards associated with exotic plant management, and the demanding and technical nature of the work, it is of utmost importance that the park's EPMT be a well-trained,

professional crew. To this end, crew members and staff all take part in a comprehensive training program, and are licensed by the State of Maine as Commercial Pesticide Applicators. Program leaders participate in regional professional meetings such as the Maine Invasive Species Network annual meeting to stay abreast of research and improve partnerships and collaborations. They also complete required NPS training on subjects such as personnel management, computer security, hazardous materials communication, and supervision. Field crew training starts with two weeks of classroom and field training the first week in May, and is continued throughout the season with weekly safety and EIP species reports and tailgate safety sessions. The team operates on the following principals, each one building on the next.

Work Safely

Exotic plant management by its very nature is hazardous work. Herbicide, hand tools, exposure to ticks, physically demanding work, remote worksites, and steep terrain are part of the team's daily operation. To enhance safety, the team has weekly training sessions to discuss the hazards encountered in the job, and how to mitigate them.

Work Effectively

The EPMT has limited time and resources. To best protect resources and meet program goals, crew members must be proficient using and caring for tools, vehicles, equipment and applying herbicide. This includes handling, transporting, maintaining, storing and using herbicides in the most safe and efficient manner possible.

Work Efficiently

Time is always a factor in exotic plant management. The longer an area is infested with exotic invasive plants, the more seed will be produced, the more disturbed the site will be, and the greater the potential for spread to surrounding sites.

Working in a safe, effective, and efficient manner allows the EPMT to best utilize it's time and resources.

2013 Management Activities and Accomplishments

After a successful first season in 2012, Frank Archuleta returned as the exotic plant program leader, and former crew member Anthony Tocci was hired as a GS-6/7 Biological Science Technician assistant crew leader. The team began its field season two weeks earlier than in previous years to better manage early-blooming species such as garlic mustard. Three new seasonal GS-5 biological science technicians began work May 5th, and one returning crew member started May 19th. While field operations were scheduled to go through October 17th, a government shutdown began October 1, 2013, and eliminated the last three weeks of the field season. Frank and Tony returned after the shutdown on October 16th to close out field operations, complete data management and reporting, and initiate 2014 hiring. Both Frank and Tony went on furlough December 15th.

In the early part of the season, the team focused on training, becoming certified or recertified by the State of Maine as commercial pesticide applicators, and conducting surveys to detect and

quantify infestations of targeted species. The EPMT worked with volunteers hand pulling garlic mustard and removing seed heads from garden lupine (*Lupinus polyphyllus*). In this time, 354 pounds of lupine seed, and over 298 pounds of garlic mustard plants were removed. Both seeds and plants were destroyed by burning.

A large stand of bush honeysuckle near Great Meadow Drive was treated with the assistance of volunteers. The operation was filmed by FOA, edited and used for public outreach, and has been posted online at: <https://vimeo.com/69269461>

Oriental bittersweet (*Celastrus orbiculata*) was re-treated at the Jordan Pond House and large vines received initial treatments near Compass Harbor.

Beginning the first of August, the EPMT began to treat purple loosestrife (*Lythrum salicaria*). This is a species that has been managed successfully at ANP for over 20 years. There are no known large infestations of purple loosestrife remaining on NPS areas. Areas previously treated will be re-surveyed every three years.

The EPMT spent August and September surveying and treating glossy buckthorn in the Bear Brook drainage. This was a complex operation that involved using multiple techniques and herbicides. The primary treatment site, located along the park boundary between Beaver Dam Pond and the Jackson Laboratory, covered approximately 12 acres and included three acres of mature glossy buckthorn growing in a dense monoculture. With permission granted by the Jackson Laboratory administrators, we treated approximately half of the infestation. Treatments included both foliar applications and treating stumps. The work of the EPMT was greatly assisted by FOA volunteers who would remove and pile buckthorn after crew members had cut and treated each stump with herbicide.

With FOA, the EPMT conducted community education throughout the season to inform the public about the threat of EIP species, and the benefits of landscaping with native species. A poster was created for an informative display that was exhibited at the opening of the Gateway Center village connector trail on National Trails Day, ANP Family Fun Day, and the Mt. Desert Garden Club annual conference in fulfillment of the Nature's Valley grant. Frank Archuleta and Tony Tocci gave a one hour presentation at the Eagle Hill Institute covering Integrated Pest Management of EIPs in ANP.

Treatment Summary

The following information summarizes the exotic plant management work completed by the ANP EPMT in 2013.

Total Acres Treated	44.39*
Total Acres Surveyed and Monitored	199.96
Total EPMT Hours	5,890
Total Volunteer Hours	318
Estimated Program Costs	\$177,734

*Acreage Treated for EIP species is determined by mapping the treated area with a hand held Trimble® GPS unit to determine gross acreage. The crew then estimates the percent cover for each treated species within the treatment area. These are then multiplied by the gross acreage to calculate Treated Acres/Species. It is possible to have over 100% coverage if you have multiple canopy layers, or species growing on top of each other. Although this is uncommon in Acadia, it is quite common on NPS lands further south, that have more favorable growing conditions. The gross acres treated and percent cover by species are recorded by crew members in the field on field data sheets. When monitoring a site to determine the effectiveness of a treatment, the current percent cover of a species can be compared to the estimate done at the time of treatment to determine how the populations in question have responded to treatment.



Exotic plant management team members in 2013 (from left): Amanda DuPrey, Frank Archuleta (exotic plant program leader), Anthony Tocci (field crew leader), Ari Giller-Leinwohl and Alex Fetgatter in a field infested with thistles on Baker Island, town of Cranberry Isles. (Not shown: Crew member Jessica Daniel, vegetation program manager Judith Hazen Connery and chief of resource management David Manski.)

2013 Work Sites

Baker Island	McFarland Hill/Park Headquarters
Bass Harbor Head Lighthouse	New Mill Meadow
Bear Brook Watershed	Ocean Path
Beaver Dam Pond	Otter Cliff Road
Brown Mountain Gatehouse	Otter Cove Watershed
Compass Harbor Tract	Paradise Hill Management Unit
Eagle Lake Carriage Road/Treatment Facility	Park Loop Road
Fernald Point/Valley Cove	Route 3 corridor, near the Tarn
Great Head	Sand Beach
Great Meadow Wetland (Unit 6)	Schooner Head Road Intersection
Heron Island	Sieur de Monts
Holy Redeemer Cemetery	Stanley Brook Road Park Entrance
Isle au Haut	Stanley Brook Watershed
Islesford Museum Grounds	Schoodic Peninsula
Jackson Laboratory (w/permission)	St. Croix International Historic Site
Jordan Pond Carriage Road	The Team's Nursery at Great Head
Jordan Pond House Grounds	The Tarn
Kent Field	Thompson Island
Ledgelawn Road Extension	Thrumcap Island
Liscomb Pit	Visitor Center/Hulls Cove House
Marshall Brook Wetland (w/permission)	Wildwood Stable

Herbicides Used in 2013

Garlon 3A[®]: active ingredient Triclopyr

Garlon 3A[®] is a broadleaf-specific herbicide that was applied using both foliar and cut stump applications. It was the most used herbicide by the EPMT in 2013. It is generally more effective on perennial broadleaf (dichotomous) species than glyphosate, particularly as a foliar application. It is considered water safe, breaks down relatively quickly in the environment, and does not tend to migrate off site. The fact that it is broadleaf-specific allows it to be used to treat broadleaf exotic plants growing in grassy areas or comingled with evergreens without damaging these native monocot species. Garlon 3A[®] is a growth regulator that works particularly well in the early part of the growing season when plants are actively growing. In the late fall, when plants were beginning to go dormant, Rodeo was substituted for Garlon 3A[®]. Garlon 3A[®] was applied according to label directions as a foliar treatment at the rate of 2.5% and later 3%. In both applications it was mixed with dye to help applicators determine which plants had been treated.

Herbicide	Acres Treated	Undiluted Gallons Used
Garlon 3A [®]	20.38	4.7

Species Treated: Burdock (*Arctium minus*), Japanese barberry (*Berberis thunbergii*), European barberry (*Berberis vulgaris*), oriental bittersweet (*Celastrus orbiculatus*), Canadian thistle

(*Cirsium arvense*), bull thistle (*Cirsium vulgare*), Japanese knotweed (*Fallopia japonica*), glossy buckthorn (*Frangula alnus*), giant hogweed (*Heracleum mantegazzianum*), golden chain tree (*Laburnum x watereri*), Japanese honeysuckle (*Lonicera japonica*), other exotic honeysuckle species (*Lonicera spp.*), multiflora rose (*Rosa multiflora*), curly dock (*Rumex crispis*), *Poison Ivy (*Toxicodendron radicans*)

*=Native species treated for visitor and employee safety along Ocean Drive Path

Rodeo[®], active ingredient Glyphosate

Rodeo[®] is a broad spectrum herbicide that was applied using both foliar and cut stump applications. It is widely used in exotic plant management because it is effective on many different species and it has low toxicity to non-plant species. It is also effective on perennial grasses such as Reed canary grass. Rodeo[®] is an amino acid disrupter. While it can be used throughout the growing season, it is particularly effective in the fall when perennial plants are sending resources to their roots. Glyphosate was applied according to label directions as a foliar treatment at the rate of 2.5% to 5%, and as a cut stump application at the rate of 25% to 50%.

Herbicide	Acres Treated	Undiluted Gallons Used
Rodeo [®]	22.81	8.26

Species Treated: Japanese barberry (*Berberis thunbergii*), Oriental bittersweet (*Celastrus orbiculatus*), Canadian thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), autumn olive (*Elaeagnus angustifolia*), winged euonymus (*Euonymus alatus*), Japanese knotweed (*Fallopia japonica*), glossy buckthorn (*Frangula alnus*), golden chain tree (*Laburnum x watereri*), honeysuckle species (*Lonicera spp.*), purple loosestrife (*Lythrum salicaria*), Reed canary grass (*Phalaris arundinaceae*), ninebark (*Physocarpus opulifolius*), bittersweet nightshade (*Solanum dulcamara*), coltsfoot (*Tussilago farfara*)

Transline[®], active ingredient Clopyralid

Transline[®] is a broadleaf-specific herbicide that was only used in foliar applications. It is particularly effective on legumes and asters. According to the label, Transline[®] cannot be applied directly to water, so the ANP EPMT applies no Transline[®] within 50 feet of any water source or wetland with standing water. Transline[®] is a growth regulator like Garlon 3A[®]. It is used in ANP for treating thistles and spotted knapweed because neither Garlon 3A[®] nor Rodeo[®] are very effective against these herbs. Transline was applied according to label directions at a rate of 0.5% as a foliar application.

Herbicide	Acres Treated	Undiluted Gallons Used
Transline [®]	1.2	0.144

Species Treated: Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), spotted knapweed (*Centaurea stoebe*)



The EPMT participated in six community outreach events. Ari Giller-Leinwohl (far left) and Frank Archuleta (left) discuss exotic plant management at the park's Family Fun Day.

Program Recommendations for 2014

- Keep current size of EPMT at six, including program leader, this size crew worked well for efficiency and effectiveness
- Replace one seasonal crew member with a GS-6, term, subject-to-furlough employee with data management skills and responsibilities (Biological Science Technician—Exotic Plants). The term position will provide program continuity, encourage personnel to return by providing health benefits and longer-term commitment (up to four years), and allow a longer season to be worked beyond the 1039 hour temporary (seasonal) positions. This term position is needed to provide support in data management and program reporting.
- Hire a GS-5, term, subject-to-furlough crew member to provide greater program continuity from season to season and to facilitate a longer season of work. This would bring the total of term crew members to four, with two seasonal positions.
- Continue to improve data management and make it consistent with other EPMT programs nationally. Current data system is changed frequently and may not depict treatments and progress to an adequate degree; an experienced data manager is needed to resolve problems.

- Continue to bring on crew in early May to facilitate managing herbaceous species such as garlic mustard and European bittercress before seed matures.
- Continue cooperative work with Jackson Laboratory, Maine Coast Heritage Trust, and possibly private landowners to address populations outside park boundaries that threaten park resources.
- Continue to seek project and NPS operational funding to support the exotic plant management program.



Alex Fetgatter preparing to row Tony Tocci, and team equipment, to the shore of Baker Island where the EPMT manages thistles.

